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ABSTRACT

The systems approach in education is a management tool that allows individuals to examine all aspects of a problem, to interrelate the effects of one set of decisions to another, and to optimally use the resources at hand to solve the problem. Five systems approaches which have been used in the successful development of instruction at the classroom level can be identified: the Teaching Research Systems Approach, the Michigan State University Instructional Systems Development Model, the System Approach for Education Model, the Project MINERVA Instructional Systems Design Model, and the Banathy Instructional Development System Model. All of these models include actions that fall into the categories of problem definition and organization, systems analysis and development, and system evaluation. These actions are interrelated by feedback built into the model. Each of the different systems approaches, while addressing the same task in similar ways, perform with different descriptions and language. Which model best fits the developer's needs will depend on the particular audience being addressed, or the particular emphasis desired. (Annotated bibliographic references to the present instructional systems approach literature and to further exploration in instructional development are also included.) (Author/SH)

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An ERIC Paper

THE SYSTEMATIC DEVELOPMENT OF INSTRUCTION: AN OVERVIEW AND BASIC GUIDE TO THE LITERATURE

By Paul A. Twelker, Floyd D. Urbach and James E. Buck

United States International University in Oregon
Corvallis, Oregon

March 1972

Issued by the ERIC Clearinghouse on Media and Technology
Stanford University, Stanford, California 94305

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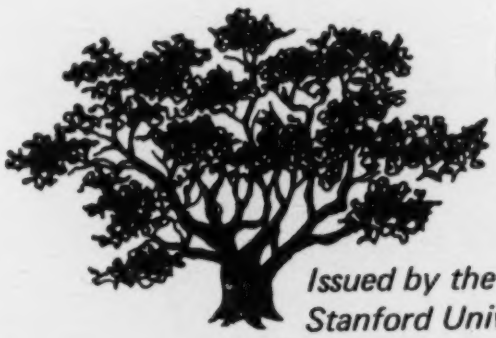

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AN OVERVIEW

1. INTRODUCTION

Systematic development of instruction is a popular idea. Approaches to systematic development vary from very simple models to very complex specifications of step-by-step approaches to developing instructional materials. Regardless of the simplicity or complexity of a particular "systems approach" to developing instruction, all models have many similarities. This paper will present five "systems approach" models and describe some of the similarities and differences between them.

2. HISTORY

The systems approach in education traces its roots back to the development of weapons systems in the military and, more recently, the production of commodities in industry. Its application in these areas was remarkably successful in allowing managers to plan for, organize staff around, direct the actions toward, and control the resources for, achieving a set goal.

The systems approach is in a very real sense a management tool that allows individuals to examine all aspects of a problem, to inter-relate the effects of one set of decisions to another, and to optimally use the resources at hand to solve the problem. Clearly, the application of the systems approach in education may lead to a number of outcomes, depending on the particular problem focused upon. Outcomes may vary from improved cafeteria service to computerized material procurement procedures. But the outcome that captures the imagination of most teachers is the provision of learning experiences that somehow are better than what are currently in use.

3. DEFINITIONS

There are several end results when a systems approach is applied carefully, thoughtfully and diligently:

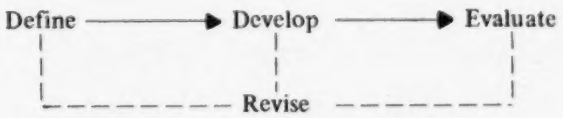
(1) The end product has a demonstrated capability of producing the desired result
(2) The end product has gone through a revision process based on information gained from students and teachers in earlier trial runs
(3) The end product consists of learning experiences linked with instructional procedures and evaluation techniques
(4) Each part of the end product can be described and the reason for it being that way can be justified.

Many instructional developers describe any set of materials which matches the above statements as an *instructional system.* To this group, an instructional system is *any set of educational materials or strategies which has been developed through the use of a systems approach.*

This is a different definition than some educators commonly use. Some teachers and administrators feel that an instructional system is a combination of machines, pictures, booklets, tests, student groups, etc. This definition relies on what the end product looks like rather than the developmental procedure used to create the end product.

Regardless of which definition you prefer for "instructional systems" there is general agreement that the "systems approach to instruction" is a systematic way of identifying, developing and evaluating a set of materials and strategies aimed at accomplishing a particular educational goal.

A simple graphical definition of a "systems approach":



Summary No. 1:

The end result of using a systematic development of instruction is an instructional system. An instructional system is, therefore, a tried and tested combination of related materials and events that consistently achieve specified objectives. In more formal terms an instructional system is an empirically developed set of learning experiences which bring about a given learning outcome for a given set of learners with a given degree of reliability.

Summary No. 2:

Systematic development consists of a series of planning, developmental and evaluation techniques which provide information to revise the instructional system until it works to the developer's satisfaction.

Summary No. 3:

Systems approaches are management techniques of seeking solutions to educational problems or at least of making maximum use of every resource available to the improvement of education.

NOT ALL SYSTEMS APPROACHES ARE ALIKE!

"Systems approaches" come in many sizes, shapes and vocabularies. Some fit only particular kinds of problems; some fit only particular kinds of solutions; and some do not fit education at all. Every developer of a systems approach model seems to like "to do his own thing" and often does with little concern for those who do not have his background and experience.

In the discussion that follows, five "systems approaches" to developing instruction will be presented. Each of them has been used in the successful development of instruction at the classroom level. Each of the approaches has been used by people other than the inventor of the approach.

4. FIVE SYSTEMS APPROACHES

Title	Author	Date
1. Teaching Research System	Hamreus	1968
2. Michigan State University Instructional Systems Development Model	Barson	1967
3. System Approach for Education (SAFE)	Corrigan	1966
4. Project MINERVA Instructional Systems Design	Tracey	1967
5. Banathy Instructional Development System	Banathy	1968

Approach 1: The Teaching Research Systems Approach

This three-stage, twenty-two step approach was developed for the educational technologist or the full-time developer of instructional systems. It has been used in a number of developmental projects, including the Dental Anatomy Program of the University of Oregon Dental School, the Modern Rhythm Film Loop Project for Washington High School in Portland, Oregon, and the Instructional Simulation Materials for Teacher Education at Teaching Research.

Approach 2: The Michigan State University Instructional Systems Development Model

This system was developed as a generic model for the systematic development of college-level courses by the teaching faculty. The model was subjected to a number of evaluation field trials during a two-year study in four major institutions of higher education. It has been used extensively at Michigan State University in the development of a number of SLATES–Special Learning Audio Tutorial Environments.

Approach 3: The System Approach for Education Model

The SAFE Model was developed by Robert E. Corrigan for educators to use as a tool for problem solving. The SAFE Model has been used at the public school, community college, graduate school, state department and educational research laboratories levels. Currently the Northwest Regional Educational Laboratory is completing a project using this approach.

Approach 4: The Project MINERVA Instructional Systems Design Model

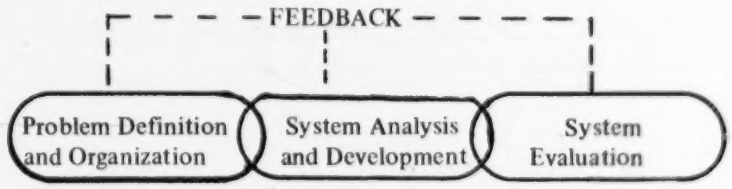
The MINERVA Model was designed as a management tool for the analysis and renovation of the entire training effort at the U.S. Army Security Agency Training Center and School. The model has been used successfully to develop and validate several instructional programs.

Approach 5: The Banathy Instructional Development System Model

This model was introduced by Bela H. Banathy in his book *Instructional Systems,* written mainly for developers of instructional systems. Banathy feels that the model places the learner in such a position that the system will be organized around him as the main component. Applications of this model have been made at higher education levels.

5. ANALYSIS AND COMPARISON

Each of the models presented includes actions that fall into three major categories: Actions that help *define* the problem and *organize* a means to solve the problem, actions that help *analyze* and *develop* solutions to the problem, and actions that serve to *evaluate* the solutions. All of these actions are inter-related by *feedback* built into the model. The provision for feedback allows the instructional system to be refined and its effect enhanced. Feedback is a critical dynamic of instructional development approaches.



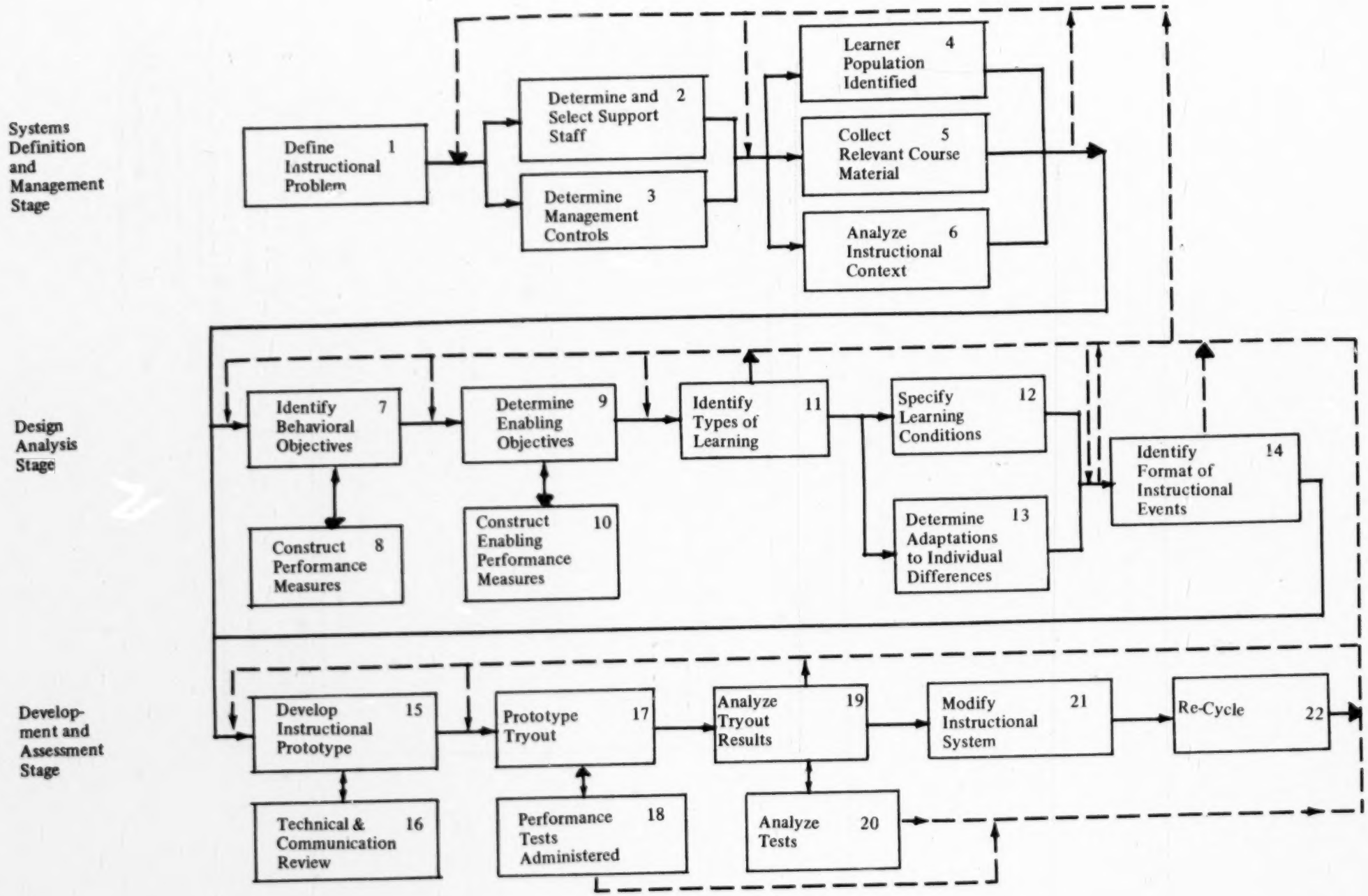
To further demonstrate similarities (and differences as well) in the five models presented, the models will be compared using key activities within the three categories above as a referent.

Problem Definition and Organization

In order to compare the vocabulary used to describe actions in this broad area, three subdivisions are proposed:

a. Identification of problem
b. Analysis of setting
c. Organization of management.

Approach 1. A FLOW DIAGRAM SHOWING THE STEPS IN THE TEACHING RESEARCH MODEL.


Systems Definition and Management Stage
Define Instructional Problem 1
Determine and Select Support Staff 2
Determine Management Controls 3
Learner Population Identified 4
Collect Relevant Course Material 5
Analyze Instructional Context 6
Design Analysis Stage
Identify Behavioral Objectives 7
Construct Performance Measures 8
Determine Enabling Objectives 9
Construct Enabling Performance Measures 10
Identify Types of Learning 11
Specify Learning Conditions 12
Determine Adaptations to Individual Differences 13
Identify Format of Instructional Events 14
Develop-ment and Assessment Stage
Develop Instructional Prototype 15
Technical & Communication Review 16
Prototype Tryout 17
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Analyze Tryout Results 19
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Modify Instructional System 21
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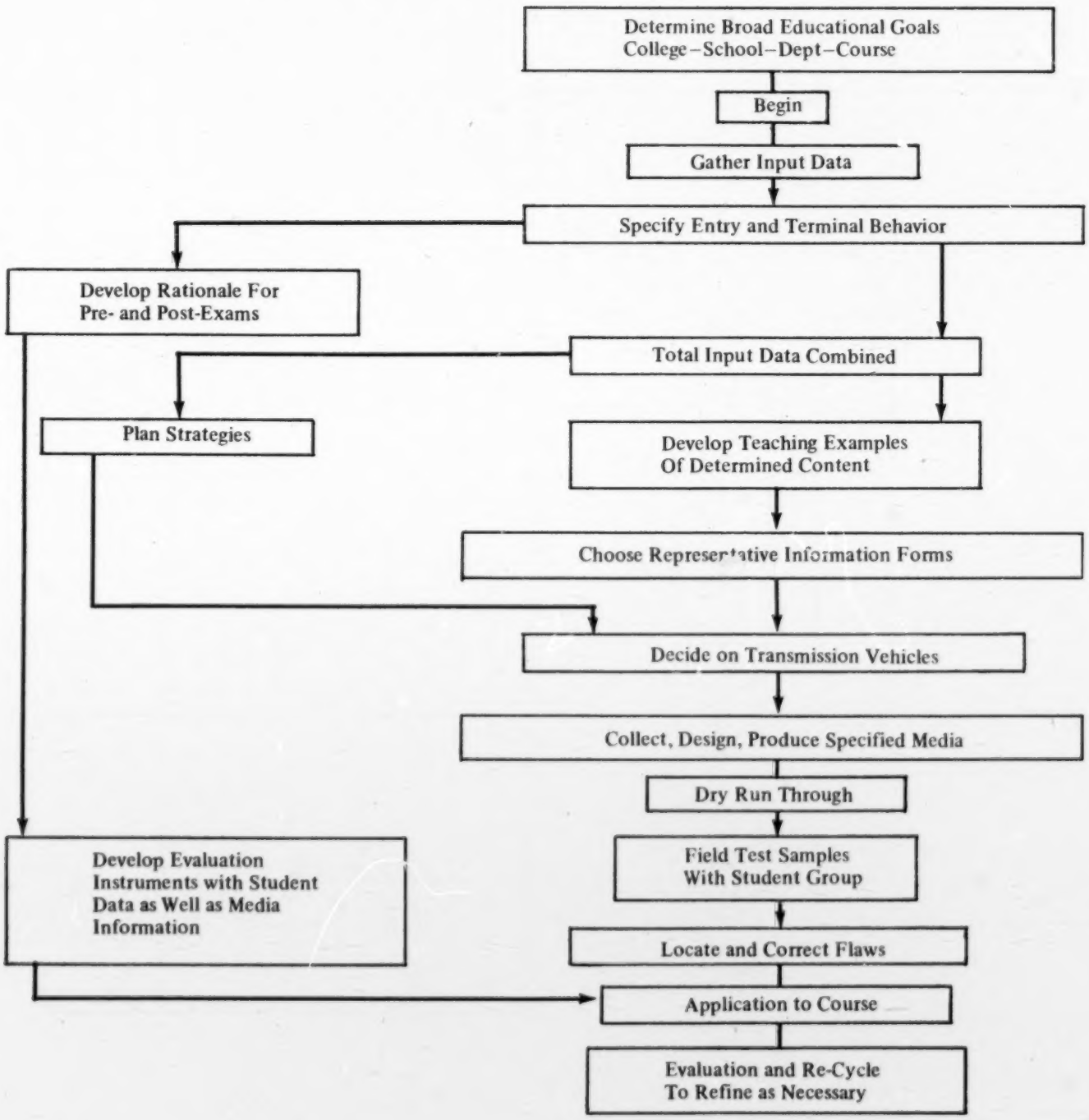
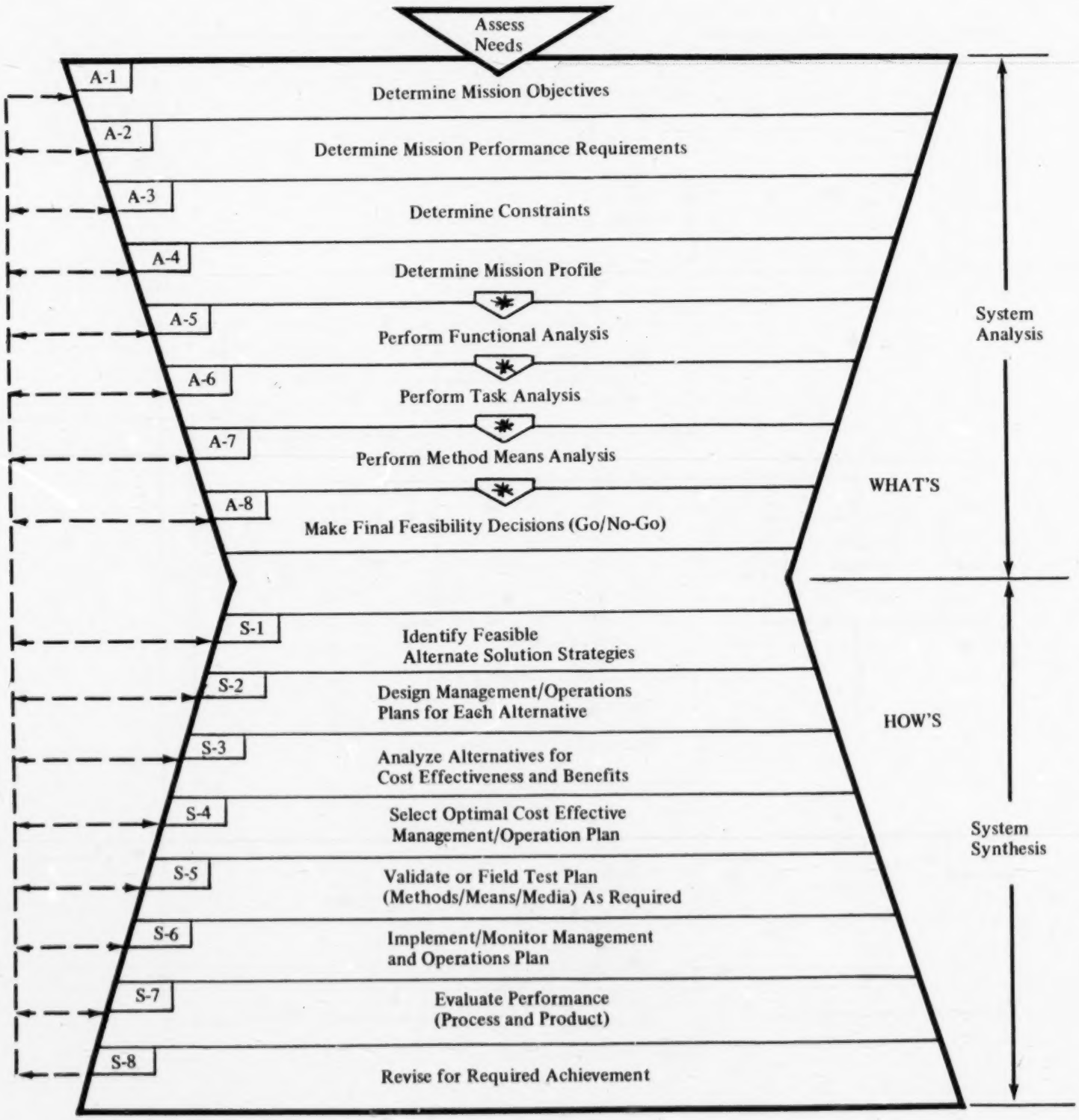
Approach 2. A FLOW DIAGRAM OF PROCEDURES IN THE MICHIGAN STATE MODEL.

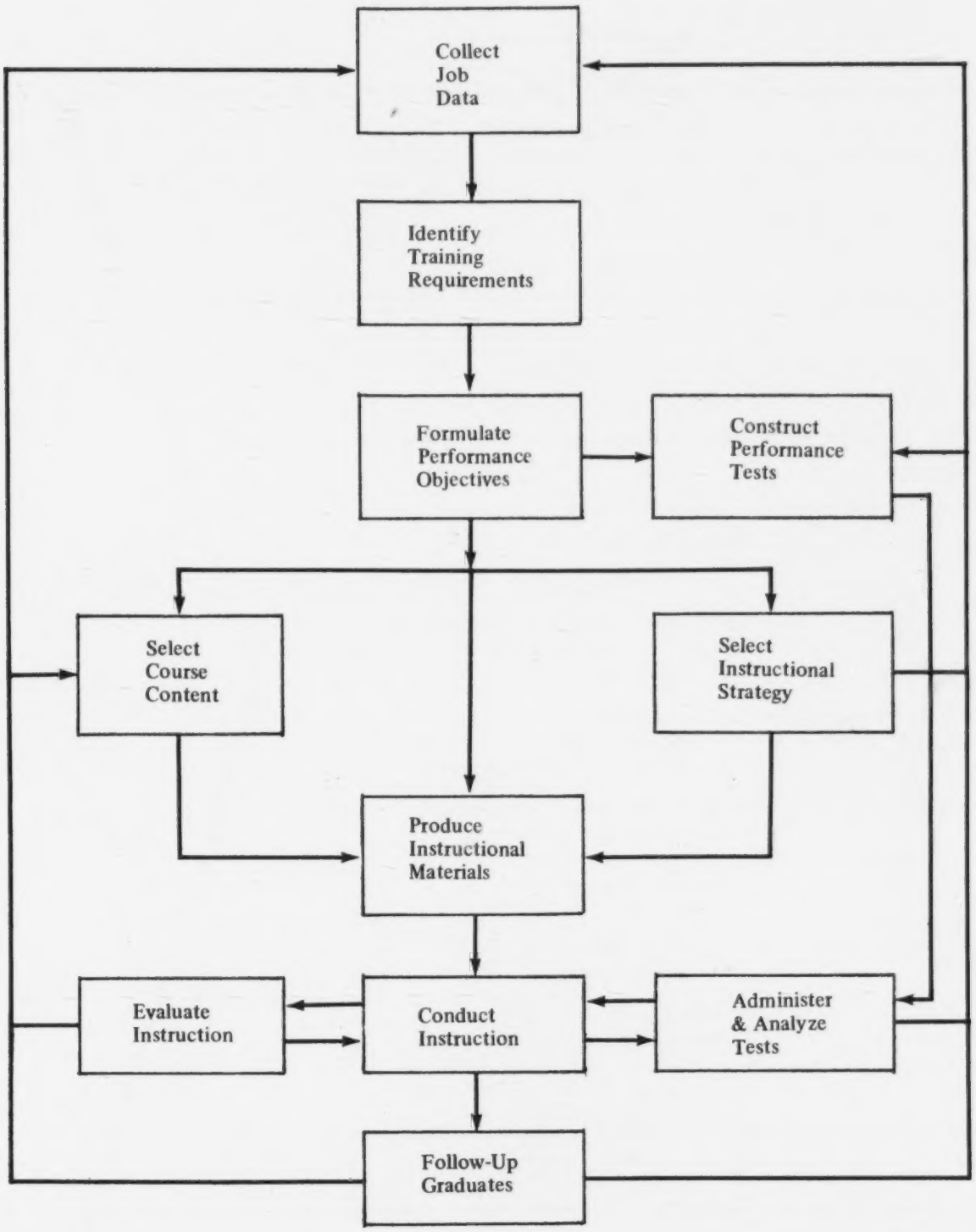


Approach 3. SAFE MODEL.

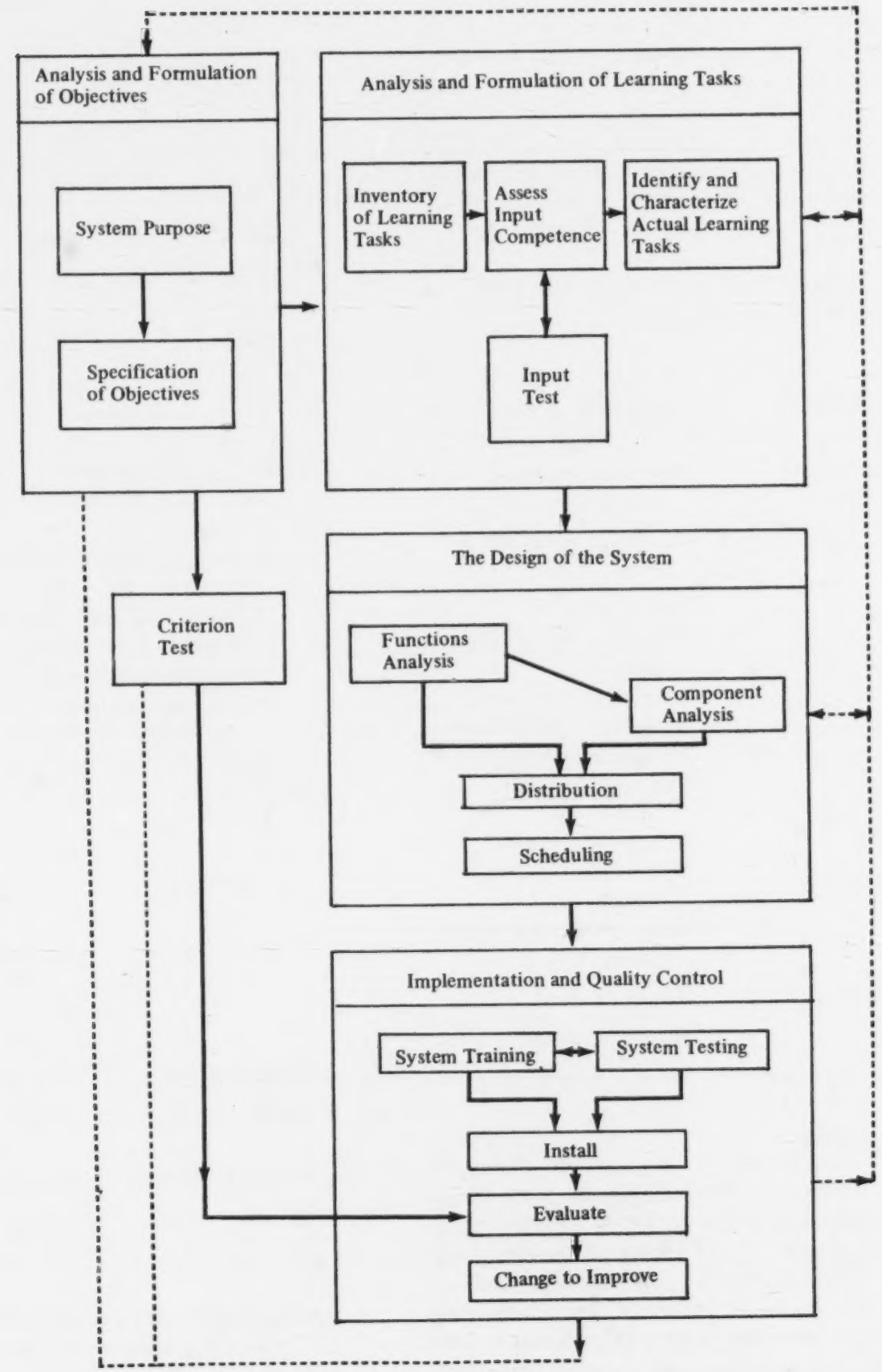


*Determine Requirement and Constraints

Approach 4. A FLOW DIAGRAM OF THE PROJECT MINERVA MODEL.



Approach 5. A FLOW DIAGRAM OF THE BANATHY MODEL.



Identification of Problem

Problems may be identified in many ways, but no matter what the technique, an essential task is to find a way, or several ways, for making a comparison between what exists and what is desired. If a large gap exists between actual and desired outcomes, the designer may be able to identify or clarify specific aspects of an educational problem; e.g., students' behavior may be inappropriate. If, on the other hand, the gap between the status quo and the ideal is small, a problem might be identified that may not need immediate attention. Once problems are identified, tentative solutions are proposed so that insights into the personal preferences of the designer can be used to suggest a first rough cut to a solution.

The language used in each of the models is different, but the intent is the same.

Model	Description of Activity
1. Teaching Research	Define instructional problem
2. Michigan State	Determine broad educational goals
3. SAFE	Assess needs Determine mission objectives Determine mission performance requirements Determine mission profile Perform functional analysis Perform task analysis Perform method-means analysis Make final feasibility decisions
4. Project MINERVA	Collect job data
5. Banathy	System purpose

Analysis of Setting

The identification of the problem and the proposing of tentative solutions help the team define the kinds of information that need to be collected. Basic steps in the analysis of the setting are to determine important characteristics of the learners and to determine the existence of school and community resources which may relate to the problem solution. This report on existing conditions and resources feeds back information to the designer to check the problem identification and feeds forward information to help organize the management required to sustain the effort. Needless to say, this activity is not done independent of the Identification of Problem activity.

Model	Description of Activity
1. Teaching Research	Learner population identified Collect relevant course material Analyze instructional content
2. Michigan State	Gather input data
3. SAFE	Determine constraints
4. Project MINERVA	Identify training requirements
5. Banathy	Testing and assessment of input competence

Organization of Management

The crucial things that must be considered here are:

- The definition of tasks and responsibility required in the effort
- The establishment of lines of communication to organize the collection and distribution of information to the development team
- The establishment of project planning and control procedures

Without formal organization, development efforts typically fail.

Model	Description of Activity
1. Teaching Research	Determine and select support staff Determine management controls
2. Michigan State	(Not specified)
3. SAFE	Design management/operations for each alternative
4. Project MINERVA	(Not specified)
5. Banathy	(Not specified)

Systems Analysis and Development

Three key activities emerge from Systems Analysis and Development:

a. Identification of objectives
b. Specification of methods
c. Construction of prototypes

Identification of Objectives

The previous activities described provide the direction to initiate the project. The next step is to identify objectives which detail precisely terminal student performance. The development team must carefully establish meaningful and measurable goals for the learner. Once terminal performance goals are specified, the team must determine exactly what is to be taught in what order through the specification of enabling objectives–objectives that bridge the gap between the behaviors of a learner entering a system and those he exhibits when he leaves the system.

Model	Description of Activities
1. Teaching Research	Identify behavioral objectives Determine enabling objectives
2. Michigan State	Specify entry and terminal behavior
3. SAFE	Determine mission performance requirements
4. Project MINERVA	Formulate performance objectives
5. Banathy	Specification of objectives

Specification of Methods

The specification of instructional strategies and media is essential to maximize the probability that the learners will attain the desired objectives. This specification activity outlines the method and format of instruction. It must be remembered that the development team cannot be certain of success the first time, but must depend on tryouts and revisions to perfect the system. Alternative methods are often specified in case the preferred strategy cannot be implemented.

Model	Description of Activity
1. Teaching Research	Identify types of learning Specify learning conditions Determine adaptations to individual differences Identify format of instructional events
2. Michigan State	Plan strategies Develop teaching examples of determined content Choose representative information forms Decide on transmission vehicles
3. SAFE	Identify feasible alternate strategies Design management/operations plans for each alternative Analyze alternatives for cost effectiveness and benefits Select optimal cost effective management/operation plan
4. Project MINERVA	Select course content Select instructional strategy
5. Banathy	Inventory of learning tasks Identify and characterize actual learning tasks Functions analysis Component analysis Distribution Scheduling

Construction of Prototypes

The previous activities provide necessary specifications to begin actual fabrication of the prototype–the first working draft of the system. Other activities of this stage include the development of an evaluation design, the initiation of a technical review of the proposed system by experts to detect any flaws and the construction of performance measures to assess post-instruction behaviors.

Model	Description of Behavior
1. Teaching Research	Develop instructional prototype Construct performance measures Construct enabling performance measures Technical and communication review
2. Michigan State	Collect, design, produce specified media Develop rationale for pre- and post-exams Develop evaluation instruments
3. SAFE	(Not specified)
4. Project MINERVA	Produce instructional materials Construct performance tests
5. Banathy	Criterion test

Evaluation

Definition and development must be followed by evaluation. The way in which the developer uses evaluation is considered by many instructional developers to be the foundation of systems approaches. Information from evaluation techniques provides a basis for deciding how well the instructional prototype achieved its objectives and can also indicate where weaknesses are that need revision as well as what kinds of revision are necessary.

If evaluation techniques are not a prominent part of the proposed procedures, either the approach is weak or it is not a systems approach. Evaluation techniques along with the careful statement of objectives are critical parts of any "useful" systematic approach. The subdivisions of evaluation are:

a. Testing of prototype
b. Analysis of results
c. Implementation/recycling

Testing of Prototypes

Testing of instructional prototypes generally takes place at one of three general levels:

- Development tryouts–looking for major flaws–revision run throughs
- Validation tryouts–to see how well students achieve objectives
- Field tryouts–to determine if other teachers and students can use the materials

Frequently, there are many tryout and revision cycles on parts of the instructional prototype. Field trials use materials which the developer hopes are the "near final" version.

Model	Description of Activity
1. Teaching Research	Prototype tryout Performance tests administered
2. Michigan State	Dry run through Field test samples with student group
3. SAFE	Validate or field test plan (methods/means/media) as required Implement/monitor management and operations plans Evaluate performance
4. Project MINERVA	Conduct instruction Administer (and analyze) tests Follow up graduates
5. Banathy	System training System testing Install

Analysis of Results

Two activities are involved here. First is tabulating and processing the evaluation data. Second is the determination of relationships between the methods used, the results obtained, and the objectives and goals desired.

Here, the development team is faced with the task of interpreting the data. The quality of the revisions to be made depends upon this interpretation.

Model	Description of Activity
1. Teaching Research	Analyze tryout results Analyze tests
2. Michigan State	Administer and analyze tests Locate (and correct) flaws Application to course
3. SAFE	(Implied in previous step)
4. Project MINERVA	Evaluate instruction
5. Banathy	Evaluate

Implementation/Recycling

From the interpretation of the data obtained during the tryout, revisions may be indicated, ranging from minor in nature to quite crucial. Toward the end of the development effort, the decision must be made at what point to stop recycling and to implement.

Model	Description of Activity
1. Teaching Research	Modify instructional system Recycle
2. Michigan State	(Locate and) correct flaws (Evaluation and) recycle to refine as necessary
3. SAFE	Revise for required achievement
4. Project MINERVA	(Implied through feedback lines)
5. Banathy	Change to improve

6. IN SUMMARY

At this point, the reader may wonder why there can't be some standardization within this hodge-podge we call the systems approach. Which model best fits the reader's needs may well depend on the particular audience being addressed, or the particular emphasis desired. For example, if the reader were quite interested in the problem identification and definition aspect of systems development, he might choose to follow the SAFE Model. On the other hand, if the reader were interested in following a model that was clear and covered all the bases well, he might turn to the Teaching Research Model. However, it should be clear from the brief comparison given above that all five of the models are addressing the same task (developing instruction) in similar ways, but with different descriptions and language.

The organizing outline used to compare the five systems approaches in this paper is a model itself. In fact, it was developed by just such an analysis as presented in this paper, but by comparison of a much larger number of systems approach models.

The model is the basis of a forty-hour institute now available to schools and school districts throughout the nation. The model is simple, yet complex enough to guide the developer in the steps of systematically developing instructional materials.

7. VOCABULARY SUMMARY

Instructional System	An empirically developed set of learning experiences which bring about a given learning outcome for a given set of learners with a given degree of reliability.
Empirical:	Tried and tested.
Learning Experiences:	The activities utilized by the teacher in interacting with the student through the system.
Learning Outcome:	Specific identifiable competencies. The end product of learning.
Reliability:	Evidence for determining the level and consistency of learner outcomes.

INSTRUCTIONAL DEVELOPMENT SYSTEM

Instructional Development Institutes
National Special Media Institutes 1971

STAGE I: DEFINE

IDENTIFY PROBLEM

Assess Needs
Establish Priorities
State Problem

ANALYZE SETTING

Audience
Conditions
Relevant Resources

SPECIFY METHODS

Learning
Instruction
Media

STAGE II: DEVELOP

IDENTIFY OBJECTIVES

Terminal
Enabling

ANALYZE RESULTS

Objectives
Methods
Evaluation Techniques

ORGANIZE MANAGEMENT

Tasks
Responsibilities
Time Lines

CONSTRUCT PROTOTYPES

Instructional Materials
Evaluation Materials

STAGE III: EVALUATE

TEST PROTOTYPES

Conduct Tryouts
Collect Evaluation Data

IMPLEMENT/RECYCLE

Review
Decide
Act

A BASIC GUIDE

1. GUIDE TO THE LITERATURE

Models of Instructional Systems Development

The following documents discuss several models for developing instructional systems. Also included are documents that discuss the area in general or provide additional bibliographic help.

Bela H. Banathy, *Instructional Systems,* Fearon Publishers, Palo Alto, California, 1968, 106 pp., $2.

An easy to understand book about systematic instructional development. The author develops the model as the book progresses. A very fine useful reference book for the novice.

John Barson, *Instructional Systems Development. A Demonstration and Evaluation Project.* U.S. Office of Education, Title III-B Project OE-3-16-025, Michigan State University. 1967.

The Michigan State model was developed in 1963-65 as a hypothetical model for systematic development of college level courses. The model was tested in a two year study of instructional development in four institutions of higher learning–M.S.U., University of Colorado, Syracuse University, and San Francisco State College.

Jack Crawford, ed., *National Research Training Manual (2nd Ed.),* Teaching Research, Monmouth, Oregon 97361, 1969, 569 pp., $15.

Four of the ten chapters are directly concerned with the systematic development of instruction, while six chapters deal with methodologies generic to both research and instructional development. Included are discussions of objectives, specifying instructional experiences, developing an instructional system, and evaluation of systems. This manual can be quite useful for the novice.

Gene Faris, "Would You Believe an Instructional Developer," *Audiovisual Instruction,* Vol. 13, No. 9 (Nov. 1968), pp. 971-973.

A good, introductory article for those interested in beginning an instructional development project. Written from the basic position that instructional development is not a search for knowledge but a devising of a solution to a problem.

Dale G. Hamreus, "The Systems Approach to Instructional Development" in *The Contribution of Behavioral Science to Instructional Technology,* Teaching Research, Monmouth, Oregon 97330, 1968, 59 pp., $1. Available from Teaching Research, Publications Secretary, Monmouth, Oregon 97361.

The primary purpose of this paper is to identify for the reader what is meant by the systems approach to instructional development. The paper explores major steps in the systems approach, terminal and enabling objectives, the six-step mini- and twenty-two step maxi-model, plus comments concerning three other instructional development models.

J. William Moore, "A Program for Systematic Instructional Improvement," *Audiovisual Instruction,* Vol. 15, No. 2 (Feb. 1970), pp. 28-31.

The results of an instructional development pilot project at Bucknell University are examined and clarified by Dr. Moore. The "Q and D" instruction development system was used in this pilot project. The "Q and D" instructional development system is a very practical and usable system for the classroom teacher.

Robert G. Smith, *An Annotated Bibliography on the Design of Instructional Systems,* Human Resources Research Office, George Washington University, Alexandria, Virginia (May 1967), 140 pp. Available from National Technical Information Source, Springfield, Virginia 22151, in microfiche for 95c, in hardcopy for $3, as document AD 653 128.

The bibliography is divided into seven major areas, each dealing with a different aspect of instructional system design: (1) systems–general; (2) training systems; (3) presentation of knowledge; (4) practice of knowledge; (5) practice of performance; (6) management of students; and (7) additional material. The major areas are further divided into subtopics where appropriate. There are 449 annotated entries in the bibliography, dating from 1950 to 1965. Key-word-in-context (KWIC) and author indexes are included.

W. R. Tracey, E. B. Flynn, Jr., and C. L. J. Legere, "Systems Approach Gets Results," in William McGehee and Paul Thayer, eds., *Training in Business and Industry,* John Wiley & Sons, New York, June, 1967, 17+, $9.95.

The Tracey, or MINERVA, model was developed by the U.S. Army as an instructional systems model. It was also a comprehensive management program to analyze and renovate the total training effort of the U.S. Army Security Agency Training Center and School.

George H. Voegel, ed., "Instructional Development: An Emerging Process," *Audiovisual Instruction*, Vol. 16, No. 10 (Dec. 1971).

The entire issue is devoted to "the emerging process of instructional development," and includes a number of articles representative of the status of the art. A number of rationales, models, and structures are explored within which instructional development could function. A gold mine of information for the novice.

Problem Definition and Organization

Included in this section are references that deal with the definition of the problem, analysis of the setting and organization of management. It should be noted in the problem definition area, a single document that discusses the parameters and summarizes needs assessment techniques could not be found. Therefore, several needs assessment techniques are referenced, but these may be quite sophisticated discussions.

Desmond L. Cook, *Program Evaluation and Review Technique Applications in Education*, U.S. Government Printing Office, Washington, D.C. 20402, 1966.

This book discusses PERT and its use in facilitating the economical management of research and development projects pertaining to education. It includes a discussion of (1) the management process in educational R & D, (2) basic characteristics of PERT, (3) the application of PERT to Educational R & D, and (4) implementing PERT on Educational R & D projects.

John C. Flanagan, "The Critical Incident Technique," *Psychological Bulletin*, Vol. 51, No. 4 (July 1954), pp. 327-358.

The historical background, early developments, and present form of the critical incident technique are discussed. A review of various developmental studies in the technique is also included. The critical incident technique consists of a procedure for collecting and analyzing directly observed incidents of human behavior having special significance and meeting systematically defined criteria. Application of the critical incident technique in the following areas are discussed: measures of typical performance (criteria); measures of proficiency (standard samples); training; selection and classification; job design; motivation and leadership (attitudes); counseling and psychotherapy. A list of 74 references is included.

Gerald Gage, *A Model for Establishing a Priority of Educational Needs*, Teaching Research, Monmouth, Oregon, February, 1970, 25 pp., $1.

A discussion of educational needs and their identification. Examines the sources for identifying needs, the determination of need values, and a need-value model for establishing a priority of needs.

Thomas F. Gilbert, "Praxeonomy: A Systematic Approach to Identifying Training Needs," *Management of Personnel Quarterly*, Vol. 6, No. 3 (Fall 1967), pp. 20-33.

Four rules provide a basis for deciding how to limit training objectives to a practical program of instruction. The first rule: instructional objectives should be expressed in terms of deficiencies only, determined by subtracting the behavior that the trainee already knows from what he will have to know in order to master a subject or task. The second rule: acquirement (what a person has learned) must be differentiated from accomplishment (the value of what a person has learned) must be differentiated from accomplishment (the value of what a person has learned). The third rule: deficiencies in knowledge must be differentiated from deficiencies in execution. The fourth rule: the value of overcoming a deficiency should be compared to instructional costs to determine a priority of objectives before planning instruction.

Olaf Helmer, "The Delphi Technique and Educational Innovation," in W. Z. Hirsh, *et al., Inventing Education for the Future*, Chandler, San Francisco, 1967, pp. 74-95, $7.95.

Discussion of an approach that may be useful for needs assessment. The method utilizes a procedure at arriving at a consensus through a recycling process.

Casper F. Paulson, ed., *A Strategy for EVALUATION DESIGN*, Monmouth, Oregon: Teaching Research, 1970. Available through Teaching Research, Publication Secretary, Monmouth, Oregon 97361, $10.

Techniques that are generally accepted as tools for systematic management are discussed in an evaluative context in Chapter VII. These techniques include network charting such as PERT and CPM.

Charles Pinnell and Michael Wacholder, *Guidelines for Planning in Colleges and Universities*, Texas College and University System, Austin, Texas, 1968, 115 pp. Available as ED 024 120 from ERIC Document Reproduction Service, P.O. Drawer O, Bethesda, Maryland 20014. 65c microfiche, $6.58 hardcopy. Available only as part of 5-volume set from Texas, $25.

Publication is especially useful to institutions of higher education. Section II, Management and Program Planning, could be of help to the instructional developer in his planning the management operation that is necessary for the success of any project.

Timothy W. Weaver, "The Delphi Forecasting Method," *Phi Delta Kappan*, Vol. 52, No. 5 (Jan. 1971), pp. 267-271.

The Delphi technique of gathering and refining several experts' opinions without actually bringing individuals together is explained and explored in this article.

System Analysis and Development

The following references deal with the identification of objectives, the specification of media methods, and the construction of the prototype.

Robert L. Baker and Richard E. Shutz (eds.), *Instructional Product Development,* Van Nostrand Reinhold Co., New York, 1971, 264 pp., $7.95.

Intended for the novice in educational research and development. The volume covers the following topics:

stating educational outcomes
constructing objectives of cognitive behavior
developing instructional specifications
educational criterion measures
rules for the development of instructional products
preparing instructional products
managing classroom contingencies

Each chapter contains expository material plus a series of exercises. Wide in scope with sufficient depth to make this a must on the novice's bookshelf.

Leslie J. Briggs, *et al., Instructional Media: A Procedure for the Design of Multi-media Instruction, A Critical Review of Research, and Suggestions of Future Research,* American Institutes for Research, Pittsburgh, 1966. Available from Librarian, American Institutes for Research, 135 N. Bellefield Avenue, Pittsburgh, Pennsylvania 15213, $4.50.

Focuses on choosing the most appropriate medium for instruction through the relating of objectives with the classes of learning identified by Gagne in his book, *Conditions of Learning.* Illustrations of the approach are provided. Final chapters include a selected review of literature on media.

Jack V. Edling, *Individualized Instruction: A Manual for Administrators,* DCE Publications, Waldo Hall, Oregon State University, Corvallis, Oregon 97331, 1970, 137 pp., $7.50 (20% discount, 5 or more).

This manual was prepared for instructional managers (principals, team leaders, etc.) as a reference source on individualized instruction (I.I.). Of specific interest in Section III are chapters on instructional and evaluation procedures, problems and solutions, and recommended implementation procedures. Other chapters are concerned with effects of I.I., reporting results, and objectives of I.I. Very useful and practical.

Jack V. Edling, *Individualized Instruction Case Studies,* Institute for Communication Research, Stanford, California 94305, 1970, 25c per case study, minimum order $1. $10 for complete set of 46 case studies (payment must accompany order).

Prepared for the district administrator to use with the lay public. Each study answers 5 questions about each of the 46 schools visited in a nationwide I.I. study. The questions concern program objectives, instructional procedures, results of the program, costs, and problems. These studies are very useful to teachers and curriculum planners as well.

Jack V. Edling, *Individualized Instruction Slide-Audio Tape Sets:* 1. Individualized Instruction: Its Nature and Effects 2. Individualized Instruction: Its Objectives and Instructional Procedures 3. Individualized Instruction: Diagnostic and Instructional Procedures 4. Individualized Instruction: Its Materials and Their Use 5. Individualized Instruction: Its Problems and Some Solutions 6. Individualized Instruction: Recommendations and Implementations, AECT, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, 1970, $10 per set. $60 for all six sets.

The six sets were prepared for 2 day administrative institutes. Essentially the same material as presented in *Individualized Instruction: A Manual for Administrators,* but in a film strip slide tape format. Very useful for groups when supported with the *Manual* and *Case Studies.*

Albert F. Eiss and Mary Blatt Harbeck, *Behavioral Objectives in the Affective Domain,* National Science Teachers Association, Washington, D.C., 1969, $2. Available from NEA Publications Sales, 1201 Sixteenth St., N.W., Washington, D.C. 20036.

Affective objectives are discussed very clearly in this publication. Since the information concerning affective objectives is limited, this should be a very valuable reference for the instructional development novice.

Michael Eraut and Geoffrey Squires, *An Annotated Select Bibliography of Educational Technology,* Books for Schools Limited, Councils and Education Press Ltd., 19 Queen Anne Street, London WIM 9LD, England, 1971, 98 pp.

A reference list of about 1,000 items which treats various aspects of educational technology has been compiled. Most of these items are books and articles, but some films, tapes, and slides are included as well. The items are divided into about seventy headings, under eight main categories: general, factors affecting curriculum decisions, managing resources, development of curriculum and materials, specific curricular subject areas, teaching or presentation methods, devices and media, and buildings and fixtures. The larger sections contain an annotation which attempts to place the listed works in perspective. Two coordinate indexes are provided which allow the reader to approach the lists from the standpoints of subject area or level of instruction. An author index and a journal index are also provided. It should be noted that this is a British publication and, as such, includes both British and American items.

Robert M. Gagne, *The Conditions of Learning,* Holt, Rinehart, and Winston, Inc., 1965, $8.25.

Draws together what is known about the process of learning for eight classes of learning. Each class is discussed in detail, along with the conditions necessary to bring about learning. A basic text for the instructional developer.

Vernon S. Gerlach and Donald P. Ely, *Teaching and Media: A Systematic Approach,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632, 1970, 480 pp., $9.95.

A combination guide and handbook on selecting and utilizing material to achieve classroom teaching/learning objectives. Included are short case histories that show how to design, implement, and evaluate instruction around teaching media. Handbook section gives a point-by-point listing of the advantages and applications of every type of media. Book includes sections on cognitive, affective, and motor skill development.

Robert Glaser, ed., *Teaching Machines and Programed Learning, II: Data and Directions,* National Education Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, 1965, 832 pp., $11.50.

Four sections include discussions on: 1) research findings on instructional programs, 2) programed instruction in five subject areas, 3) implementation of programed instruction, and 4) a behavioral science base for instructional design. The book, although somewhat dated, still ranks high as a significant contribution to an instructional system designer's efforts.

Norman E. Gronlund, *Stating Behavioral Objectives for Classroom Instruction,* McMillan Limited, London, 1970, 58 pp., $1.50.

Discusses instructional objectives as learning outcomes, stating general instructional objectives and specific learning outcomes, selecting appropriate instructional objectives, relating objectives to classroom instruction and using objectives in test preparation. Although there are literally dozens of references on this same topic, this one was picked out for its clarity, usefulness, and breadth of coverage.

Learning Directory, Westinghouse Learning Corporation, 100 Park Avenue, New York, New York 10017, 1970, 6700 pp. in 7 volumes, $90.

A comprehensive guide to teaching materials at all levels that includes 205,000 print and non-print items. Included are materials for purchase, loan, rental and free. Useful for developing an entire curriculum collection, organizing a collection for depth, assembling material for contrast and comparison, and creating a multimedia package.

New Spaces for Learning, Center for Architectural Research, School of Architecture, Rensselaer Polytechnic Institute, Troy, New York 12181, $3.50.

Originally published in 1961 and revised in 1966, *New Spaces for Learning* provides comprehensive guidance for the design and planning of media-oriented learning spaces focused on the student user of medium and large group rooms. Included are a series of design studies and documentation of a case study demonstration, the experimental classroom built at RPI.

W. James Popham and Eva L. Baker, *Establishing Instructional Goals,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632, 1970, 128 pp., $2.25 paperbound, $4.95 hardbound.

Considered are: how to select goals, how to state goals, and how to establish pupil performance standards. Geared to pre-service and in-service teachers. A self-instructional program format is used, and a set of filmstrip-tape programs are available from Vimcet Associates, Inc., P.O. Box 24714, Los Angeles, California 90024.

W. James Popham and Eva L. Baker, *Planning an Instructional Sequence,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632, 1970, 128 pp., $2.25 paperbound, $4.95 hardbound.

Expected competency outcomes resultant from using this self-instructional program focus on the planning of a series of instructional activities to promote learner attainment of explicit instructional objectives. Geared to pre- and in-service teachers, kindergarten through college. Companion audiovisual materials are available from Vimcet Associates Inc., P.O. Box 24714, Los Angeles, California 90024.

W. James Popham and Eva L. Baker, *Systematic Instruction,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632, 1970, 160 pp., $2.25 paperbound.

Orientation to the nature of instruction for those preparing to be teachers. Serves as an introduction to the kinds of general instructional strategies and particular teaching tactics. The book may be used separately or in conjunction with the two other texts by Popham and Baker, each consisting of a set of self-instructional programs.

P. J. Tansey, ed., *Educational Aspects of Simulation,* McGraw-Hill Publishing Co., Ltd., Wodenhood-Berkshire, England, 1971, 274 pp.

About the most complete reference book to date on simulation and gaming as these techniques relate to instruction. Chapters include discussions of programmed non-simulation games, simulation in teacher education, simulation of international relations, simulation games, and simulation and media.

The Affective Domain, A Resource Book for the Media Specialist, National Special Media Institute, 1970, 180 pp. Available through Gryphon House, 1333 Connecticut Avenue, Washington, D.C. 20036, $4.95 paperbound, $7.50 hardbound.

The seven chapters of this volume present at least seven diverse viewpoints written by seven different sets of authors. Both the chapters and authors possess one common attribute: a concern with developing instruction which interests, involves, and motivates learners. Seven facets of human feeling, or affect, are presented by authors who have been engaged in the basic research and instructional applications of that particular approach.

The book is intended primarily for the instructional technologist who is involved in designing, developing, or revising instructional systems. However, the chapters are useful to anyone concerned with the improvement of instruction. The reader will find that each chapter loosely fits a three-stage pattern: 1. The approach and its background, 2. Examples of the research and developmental studies, 3. Implications for instruction.

The Psychomotor Domain, A Resource Book for the Media Specialist, National Special Media Institutes, 1971. Available through Gryphon House, 1333 Connecticut Avenue, Washington, D.C. 20036, $4.95 paperbound, $7.50 hardbound.

The psychomotor domain is concerned with the physical activities of the body such as coordination, reaction time and muscular control. Despite a long history of attention in the elementary schools, physical education areas and in some vocational areas, many educators and researchers have ignored this area of knowledge. The philosophy of the psychomotor conference and institute was to probe this area of human behavior and to look for possible applications to learning and to teaching. Thus, this book can be a valuable asset to the teacher or administrator developing instructional systems.

Donald T. Tost and John R. Ball, "A Behavioral Approach to Instructional Design and Media Selection," *AV Communication Review,* Vol. 17, No. 1 (Spring 1969), pp. 5-25.

Authors discuss a model for examining systematically most of the important considerations and trade-offs between possible instructional formats.

R. A. Weisgerber, ed., *Developmental Efforts in Individualized Learning,* F. E. Peacock Publishers, Inc., Itasca, Illinois, 1971, 361 pp., $6.50 paperbound, $9.50 hardbound.

The actual developmental classroom efforts in individualized learning are explored in this the second of Weisgerber's books. The book is a valuable reference in that it looks at current efforts focused for the reader in four frameworks: (1) national level (Project PLAN and IPI);(2) elementary and secondary;(3) higher education; and (4) the future of individualized learning.

R. A. Weisgerber, ed., *Perspectives in Individualized Learning,* F. E. Peacock Publishers, Inc., Itasca, Illinois, 1971, 406 pp., $6.50 paperbound, $9.50 hardbound.

The readings presented here are an analysis of selected factors underlying the process of individualized learning. The book is organized topically and moves from theoretical considerations toward an analysis of important educational components. The readings come from a cross section of experts representing the areas of learning theory, individual differences, measurement and evaluation, educational objectives, teacher roles, learning activities, facilities, technology, and computer systems. Each chapter is prefaced with an introduction by the editor. Chapter topics include: underlying assumptions concerning the need for individualized learning, mental abilities as a possible basis for individualization, the impact of individual differences on reading, the measurement and accommodation of individual differences, educational objectives, evaluation, the changing role of the teacher, individualized and interactive learning activities, the instructional environment, and computer-assisted instruction.

System Evaluation

This section references selected documents that deal with the evaluation of an instructional system.

Paul E. Blackwood and T. R. Porter, *How to Evaluate Science Learning,* National Science Teachers Association, Washington, D.C., 1968. Available from NEA Publications Sales, 1201 Sixteenth St., N.W., Washington, D.C. 20036.

A good evaluation guide for science learning. Easily adaptable for other content areas.

B. S. Bloom, J. T. Hastings, and G. F. Madaus, *Handbook on Formative and Summative Evaluation of Student Learning,* McGraw-Hill Book Company, 1971, 923 pp. $11.95.

The book is about the "state of the art" in student learning evaluation and is intended primarily for present and future teachers. Topics discussed in Part 1 include 1) evaluation problems likely to be encountered by teachers, 2) purposes of evaluation and types of evaluation instruments, 3) evaluation techniques for cognitive and affective objectives, and 4) evaluation systems. Chapters in Part 2 provide illustrations of objectives and testing techniques, and are intended to help teachers in different disciplines and levels to use evaluation to improve learning in these specific areas. A gold mine of information.

Norman Frederiksen, "Proficiency Tests for Training Evaluation," in *Training Research and Education,* Robert Glaser, ed., John Wiley and Sons, 1965, pp. 323-346. $2.65.

Easy to read essay discusses seven methods of training evaluation and mentions advantages and disadvantages of each.

Hulda Grobman, "Evaluation Activities of Curriculum Projects: A Starting Point," AERA Monograph Series on Curriculum Evaluation, No. 2, Rand McNally and Co., Chicago, 1968.

Presents an excellent discussion at both a conceptual and applied level on evaluation with clear easy to understand sections on sampling, scheduling, and budgeting.

Casper F. Paulson, ed., *A Strategy for EVALUATION DESIGN,* Monmouth, Oregon: Teaching Research, 1970. Available through Teaching Research, Publication Secretary, Monmouth, Oregon 97361, $10.

Discusses the following: (1) Purpose for evaluation (2) Defining the evaluation content, (3) Information collection procedures, (4) Instrumentation, (5) Information processing, (6) Distribution of information, and (7) Evaluation as management methodology. This is an excellent information and reference source for the novice. The book also includes a fine evaluation annotated bibliography.

Daniel L. Stufflebeam, *et al.* (eds.), *Educational Evaluation and Decision-Making,* Phi Delta Kappa, Inc., Eighth & Union, Bloomington, Indiana, 1971. $7.50.

This book explores five problem areas: definition, decision-making, values and criteria, administrative levels, and the research model. It identifies and assesses approaches to deal with these problem areas and synthesizes a new definition and methodology of evaluation resulting from the assessment. Finally, it provides operational guidelines for implementing the proposed new approach.

Instructional Systems on The Systems Approach

There are a number of instructional packages available on particular models of developing systems or on aspects of the systems approach. Some of these packages are referenced in this section.

Robert Corrigan, Roger Koffman and Northwest Regional Laboratory, *Planning How to Get from Here to There,* R. E. Corrigan Associates and N.W. Regional Lab, 1971. Available from R. E. Corrigan Associates, 8701 Adah Street, Garden Grove, California 92640 or Northwest Regional Laboratory, 710 S.W. 2nd, Portland, Oregon 97204. Under development in 1972.

This instructional planning system is developed for teachers. Also available from R. E. Corrigan Associates are planning systems for administrators and policy makers, and curriculum developers. The materials are based on an adaptation of the SAFE instructional development model.

David Cram, *Designing Effective Instruction,* General Programmed Teaching, Palo Alto, California, 1970. Available through General Programmed Teaching, Quail Hill, San Rafael, California 94903.

A complete audio/tutorial/workbook workshop in instructional systems application. This fifteen unit audio/tutorial instructional system is a complete workshop for the teacher or administrator wanting to use instructional systems techniques to improve *classroom* student learning. Total package $650-675.

Objectives for Instructional Programs, Insgroup, Inc., Long Beach, California, 1970. Available from Insgroup, Inc., 5855 Naples Plaza, Suite 204, Long Beach, California 90803. Total package $75.

A programmed audio/tutorial package. The package contains film strips, tapes, overheads, and print media material. It is designed for both self or individualized instructional use in selecting and writing objectives for instructional programs.

Stuart and Rita Johnson, *Developing Individualized Instructional Material: A self-instruction material in its self,* Westinghouse Learning Press, 2680 Hanover Street, Palo Alto, California 94302. $3.75.

Good basic reference material. An individualized, self-instructional format is used to guide the reader through chapters on (1) Specifying and Analyzing Objectives, (2) Measurement and Obtainment of Objectives, (3) Arranging Instructional Activities, (4) Select and Design Methods and Materials, (5) Refining the Instructional System. Each chapter contains objectives, study material and criterion tests.

Hillery M. Motsinger, *How to Develop LE MOT Instructional Packages,* Los Angeles, Pepperdine University, 1971. Available from Pepperdine University, School of Continuing Education, Independent Study Program, 8035 S. Vermont Avenue, Los Angeles, California 90044, ATTN. Dr. Hillery M. Motsinger. Available as: 1. District In-Service 2. Home Study Quarter 3. Institute Workshop 4. Academic 3 hour course.

This is a "how to" program on the preparation and use of the Le Mot Instructional Package. A Le Mot Instructional Package is a set of learning materials built around one central concept. It contains learning activities which systematically lead the student toward the achievement of clearly defined objectives: mastery of the central concept and of the secondary ideas (subconcepts) which support it. This set of materials will provide the novice with needed information and skills to develop instructional systems for the classroom.

GUIDE FOR FURTHER EXPLORATION

Some Selected Centers of Activity

The following groups represent some of the scores of centers of activity in instructional development. An attempt was made to include a number of different types of centers, with respect to focus and size. The listing is by no means exhaustive. Each entry includes the names of key professional staff members, and the present goals and activities.

American Justice Institute, Suite 406, 1007 7th Street, Sacramento, California 95814, (916) 444-3096 (Non-profit organization). Harland Hill, Stanley K. Gryde.

Conduct of training and educational programs in the field of law enforcement employing audio-tutorial system of instruction. Development of systems; conduct of research and training programs. Interests include the application of techniques of individualized instruction within the criminal justice area, particularly in the field of corrections.

American Institutes for Research, 8555 Sixteenth Street, Silver Springs, Maryland 20910, (301) 587-8201 (Non-profit corporation). John C. Flanagan, Edwin A. Fleishman, Paul A. Schwarz, Brent Baxter.

Conduct of research and development in behavioral science and education. Development of instructional systems and conduct of research on problems relating to systems. Descriptive materials available.

Center for Instructional Development, Syracuse University, 115 College Place, Syracuse, New York 13210, (315) 476-5541, Ext. 4571 (College-wide development unit.) Robert M. Diamond.

Application of systems procedure in the major redesign of basic courses and programs throughout the University. Evaluation of projects to identify effectiveness of the programs and of the system that is being followed. Publications and descriptive materials available.

Computer-Assisted Instruction Laboratory, 312 Sutton Hall, The University of Texas at Austin, Austin, Texas 78712, (512) 471-1044 (University-related department). C. Victor Bunderson, Wilson A. Judd, Rex Arnett.

Research in the area of instructional design and the development of computer-assisted instruction for higher education. System approach employed in the development of CAI under contract or grant funding. Publications and descriptive materials available.

Department of Educational Research and Testing, Instructional Systems, College of Education, Florida State University, Tallahassee, Florida 32302, (904) 599-2152 (University-related department). Leslie J. Briggs.

One program in Educational Research is Instructional Systems. Training in research, development and evaluation of systems for promoting effective learning by means of a doctoral level program. All activities relate to the education of doctoral students. Systems of learning and instruction are analyzed in terms of 1) needed theory of instruction, 2) alternate models for instructional design, 3) optimal utilization of the various media of instruction, 4) effective application of educational technology and 5) the comparative cost-effectiveness of alternate instructional models, systems, and materials. Descriptive materials available.

Department of Educational Technology, Arizona State University, Box FLS, Tempe, Arizona 85281, (602) 965-3154 (University-related department). Howard J. Sullivan.

Interests center on empirically-based methods of product development. Conduct of research and training activities. Publications and descriptive materials available.

Department of Instructional Research and Development, Instructional Services Division, Brigham Young University, Provo, Utah 84601, (801) 374-1211, Ext. 2635 (University-related department). M. David Merrill, R. Irwin Goodman.

Basic research on instructional processes. Systematic development of instruction, specializing at the college level. Training programs for professional instructional psychologists and for lay people included in instructional development. Publications and descriptive material available.

Department of Instructional Technology, College of Education, Wayne State University, Detroit, Michigan 48202, (313) 577-1620 and 577-1740 (University-related department). Tom Burford, John W. Childs, John M. Gordon, Albert Stahl.

Training of instructional development specialists. Conduct of subsidiary activities for the university. In-house papers, working designs, and descriptive materials available.

Design and Administration Training Project, 1776 University Avenue, Wist 105, Honolulu, Hawaii 96822, (808) 944-8871 (University-related department). Geoffrey Kucera, Ron Sparks, Clay Vollan, Lillian Lum, Walter Wittich.

Acquiring of the working knowledge of Media Learning Systems Design and Administration. Understanding the principles of systems analysis applied to media resource administration, with emphasis on analysis, evaluation and validation of media systems design. Understanding analysis and application of media research and media-related learning theory. Understanding of the nature of interpreting media learning systems needs into cost budgeting, including cost analysis as it is related to learner efficiency. Gaining of experience as "agent of change" in working with students, teachers, and other school personnel to bring about a climate within which media-oriented learning strategies can be employed with effectiveness. Design and administration of a media systems-based learning demonstration of a clearly delimited scope, which is feasible in terms of time, manpower and budget. Evaluation of the efficiency of an action demonstration of the media learning systems described above through close cooperation of administrators and teachers. Evaluation of a learning demonstration in terms of behavioral outcomes and to communicate this evaluation via 16mm sound motion picture and/or television formats.

Division of Curriculum Development and Technology, Hawaii State Department of Education, 1625 University Avenue, Honolulu, Hawaii 96822, (808) 944-7110 (Branch, Hawaii State Department of Education). Shinkichi Shimabukuro

and

Curriculum Research and Development Group, University of Hawaii, 1776 University Avenue, Honolulu, Hawaii 96822, (808) 944-7111 (University-related department). Arthur R. King, Jr.

A cooperating relationship exists between these two centers. Emphases on large-scale, long-range systematic curriculum design, research, development, evaluation and installation, and needs assessment. Examples include the Hawaii English Program, the Hawaii Music Program and Foundational Approaches to Science Teaching (FAST). Products available in Hawaii. Descriptive materials available.

Division of Instructional Systems Technology, School of Education, Indiana University, Bloomington, Indiana 47401, (812) 337-1362 or 337-1013 (University-related department). K. Gene Faris, Robert Heinich, John Moldstad, Thomas Schwen, Richard Stowe.

Refinement of models of instructional development through practice, research, and collaboration with other investigators. Dissemination of resultant models through papers, reports, presentation and other channels. Training of professional developers through degree programs (including the doctorate), workshops, institutes, internships, and short courses. Products, publications and descriptive materials available.

Education and Training Consultants Company, Box 49899, Los Angeles, California 90049, Visits by appointment only: Suite 217, 12121 Wilshire Blvd., Los Angeles, California 90025, (213) 472-2444 (Unincorporated firm). Leonard C. Silvern.

Goals are to apply systems engineering techniques to education and training environments; to develop new methods, shape these into a curriculum, and teach courses at ETC and at institutions of higher learning in these new techniques; to produce courses in innovative formats, including computer-assisted instruction; to mathematize flowchart models, write the equations, produce computer programs and run computer simulations in the education and training environments. Activities include: conduct of contract research; conduct of feasibility studies for proposed systems; conduct of studies to improve or eliminate systems; conduct of courses to instruct in systems techniques; and development of plans, including computer components, for systems. Products, publications, and descriptive materials including catalog available.

Educational Services Division, General Learning Corporation, 5454 Wisconsin Avenue, N.W., Washington, D.C. 20015, (301) 657-2610 (Private corporation). Mary L. Millar.

Marketing of instructional materials developed by systems approach. Design and conduct of custom-tailored training programs on planning, instructional objectives, instructional management in open-space classrooms, day care, reading, teaching skills, and other topics for teachers, administrators, paraprofessionals, Peace Corps volunteers, domestic ACTION volunteers and trainers, etc. Planning of comprehensive systems including curriculum, staffing, administrative support, and facilities specifications and design. Products, publications and descriptive materials available.

Insgroup, Inc., Instructional Systems Group, 5855 Naples Plaza Drive, Long Beach, California 90803, (213) 433-0452 (Private corporation). Bruce Monroe.

Promotion of the development and use of instructional systems at all levels of education in this nation and developing nations worldwide. Production of instructional systems to meet clients' specifications. Development of systems for in-house use. Motivation of faculty and staff to use instructional systems. Research on problems relating to the use of instructional systems. Conduct of training programs for school staffs in which they learn how to develop and use instructional systems. Products and descriptive materials available.

Instructional Development Corporation, 25 Northway, Independence, Oregon 97351, (503) 838-1843 (Private corporation). Allen Lee, James Beaird, Casper Paulson, Jr., Thomas Haines, Paul A. Twelker.

Development and dissemination of instructional systems of demonstrated and describable effectiveness. Development and marketing of instructional systems. Provision of educational consulting services. Products, publications and descriptive materials available.

Instructional Development Division, United States International University, P.O. Box 1028, Corvallis, Oregon 97330, (503) 753-1671 (University-related educational resource and research center). Floyd Urbach, Paul Twelker, Dale Hamreus, Jack Edling.

Study and application of systematic approaches to the development and evaluation of instructional settings, materials and procedures. Strong emphasis placed on the role of instructional technology in facilitating many of the kinds of learning designs necessary to individualize instruction and/or to establish group learning activities which result in student achievement of specific objectives. Products, publications and descriptive materials available.

Instructional Development Service, Michigan State University, 427 Administration Building, East Lansing, Michigan 48823, (517) 353-1697 (All-University agency). John E. Deitrich, Robert Davis, Paul Witt, Charles F. Schuller.

Improvement of undergraduate instruction through the development of courses that utilize the instructional development (systems) philosophy. Training of graduate students in instructional development. Products, publications and descriptive materials available.

Instructional Objectives Exchange, Box 24095, Los Angeles, California 90024, (213) 478-0947 (Non-profit corporation). John D. McNeil, Eva L. Baker.

Serving as a clearinghouse through which the nation's schools can exchange instructional objectives. Collection and, when necessary, development of measuring techniques suitable for assessing the attainment of the objectives available through the exchange. Development of properly formulated instructional objectives in important areas where none currently exist. Conduct of research in relation to objectives and measures. Products, publications and descriptive materials available.

National Special Media Institutes, A Consortium of Institutions: Michigan State University, Syracuse University, United States International University, University of Southern California. Charles F. Schuller, Director NSMI, Instructional Media Center, Michigan State University, East Lansing, Michigan 48823. Donald Ely, Director, Center for Instructional Communications, 1212 College Place, Syracuse University, Syracuse, New York 13210. Jack Edling, United States International University, P.O. Box 1028, Corvallis, Oregon 97330. William Allen, Department of Instructional Technology, University of Southern California, Los Angeles, California 90007.

Assisting of school systems with a real desire to find innovative and effective solutions to consequent learning and instructional problems by the provision of effective initial training and competencies in Instructional Development.

Professional consultation to help assure the long-term gains of which Instructional Development is capable. Products, publications and descriptive materials available.

Radiologic Technology Program, Health Sciences Division, Hostos Community College, 260 East 161st Street, Bronx, New York 10451, (212) 993-8000 (Community college related department; part of CUNY system). Leroy Sparks, Marilyn Schima.

Provision of individualized instruction for students enrolled in radiologic technology by developing instructional systems for performance objectives. Development of radiologic instructors skilled in the use of instructional systems by providing workshop training in federally funded projects. Products and publications available.

Technological Applications Project, United States International University, P.O. Box 1028, Corvallis, Oregon 97330, (503) 753-1671 (University-related project). Floyd Urbach, Paul Twelker, Frank Nelson.

Provision of teachers, administrators and instructional developers with information on existing instructional systems, gained through a nationwide survey; planning for a nationwide Instructional Systems Dissemination Network for educational institutions in elementary, secondary, higher education, vocational education and adult education. Products, publications and descriptive materials available.

Teaching Research, A Division of the Oregon State System of Higher Education, Monmouth, Oregon 97361, (503) 838-1220 ext. 391 (Institution of a Unified State System of Higher Education). James H. Beaird, Harold E. Fredericks, Victor Baldwin, Casper F. Paulson, F. Leon Paulson, Michael Saslow, John Williamson.

Conduct of disciplined inquiry (Research, Development, Diffusion, Evaluation) into the teaching function and those factors which influence, affect, modify or interact with that function. Disciplined Inquiry activities conducted in six program areas: Affective-Cognitive Techniques, Evaluation, Exceptional Child Research, Health Manpower, Higher Education, Learning conducted in six program areas: Affective-Cognitive Techniques, Evaluation, Exceptional Child Research, Health Manpower, Higher Education, Learning Ecologies. Instructional systems are researched, developed and marketed within each program. All programs conduct short term training. Products, publications and descriptive materials available.

The following regional educational laboratories provide a variety of services and products to the educational community. Descriptive materials on their programs are available upon request.

Laboratory/Contact	*Address/Telephone*
Appalachia Educational Laboratory (AEL) Dr. Benjamin Carmichael	P.O. Box 1348 Charleston, West Virginia 25325 Telephone: (304) 344-8371
CEMREL, Inc. Dr. Wade M. Robinson	10646 St. Charles Rock Road St. Ann, Missouri 63074 Telephone: (314) 429-3535
Center for Urban Education (CUE) Dr. Robert A. Dentler	105 Madison Avenue New York, New York 10016 Telephone: (212) 889-7277
Far West Laboratory for Educational Research and Development (FWLERD) Dr. John K. Hemphill	1 Garden Circle, Hotel Claremont Berkeley, California 94705 Telephone: (415) 841-9710
Mid-Continent Regional Educational Laboratory (MCREL) Dr. Lochran R. Nixon, Jr.	104 East Independence Avenue Kansas City, Missouri 64106 Telephone: (816) 221-8686
National Laboratory for Higher Education (NLHE) Dr. Everett H. Hopkins	411 West Chapel Hill Street Durham, North Carolina 27701 Telephone: (919) 688-8057
Northwest Regional Educational Laboratory (NWREL) Dr. Lawrence D. Fish	500 Lindsay Building 710 S.W. Second Avenue Portland, Oregon 97204 Telephone: (503) 224-3650
Research for Better Schools, Inc. (RBS) Dr. Robert G. Scanlon	Suite 1700/1700 Market Street Philadelphia, Pennsylvania 19103 Telephone: (215) 561-4100
Southwestern Cooperative Educational Laboratory, Inc. (SWCEL) Dr. James J. Wilson	117 Richmond Drive, N.E. Albuquerque, New Mexico 87106 Telephone: (505) 265-9561
Southwest Educational Development Laboratory (SWEDL) Dr. James H. Perry	800 Brazos Street Austin, Texas 78701 Telephone: (512) 476-6861
Southwest Regional Laboratory for Educational Research and Development (SWRL) Dr. Richard Schutz	11300 La Cienega Boulevard Inglewood, California 90304 Telephone: (213) 776-3800

The list of centers of activity includes several instructional technology graduate degree programs. For a more exhaustive listing of institutions offering graduate programs, refer to the following reference:

L. C. Larson, *Instructional Technology Graduate Degree Programs in U.S. Colleges and Universities, 1969-71,* Association for Educational Communications and Technology, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, 1971, $3.

Professional Organizations

Institute for Educational Development (IED), 52 Vanderbilt Avenue, New York, New York 10017.

Educational corporation engaged in research and development designed to encourage favorable changes in educational practice, both formal and informal, for students in all stages of development. IED's program concentrates on learning and instruction, with emphasis on curriculum materials, equipment, and systems. A division of IED, Educational Products Information Exchange, EPIE (now Educational Product Report) was established to gather, codify, and disseminate dependable information about specifications, critical characteristics, and actual school performance of instructional materials, equipment and systems for preschool through junior college grades.

National Society for Programmed Instruction (NSPI), P.O. Box 137, Cardinal Station, Washington, D.C. 20017.

Members usually include persons concerned with the preparation and use of programmed learning materials for schools, industry, the military, government, and health sciences. Publications: (1) *NSPI Newsletter,* 10 issues/year; (2) *NSPI Journal,* quarterly; (3) NSPI Official International Directory of Members, annual.

American Educational Research Association, 1126 Sixteenth Street, N.W., Washington, D.C. 20036.

Professional organization of behavioral scientists and educators interested in the development, application, and improvement of educational research. Members include professors, state and local school system research directors, research specialists, graduate students of education, and educators in foreign countries. Divisions: (A) Administration, (B) Curriculum and Objectives, (C) Instruction and Learning, (D) Measurement and Research Methodology, (E) Counseling and Human Development, (F) History and Historiography, (G) Social Context of Education, and (H) School Evaluation and Program Development.

Publications: (1) *Educational Researcher,* 10 issues/year; (2) *Review of Educational Research,* 5 issues/year; (3) *American Educational Research Journal,* quarterly; (4) *Handbook of Research on Teaching.*

Association for Educational Communications and Technology, 1201 Sixteenth Street N.W., Washington, D.C. 20036.

The AECT is trying to improve instruction through the effective use of educational technology. Its members are mainly audiovisual and instructional materials specialists, educational technologists, instructional development specialists, audiovisual and television production personnel, and teacher educators. AECT Divisions are segments of the membership organized to represent major educational communications and technology professional interest areas:

Industrial Training and Education
Information Systems
Instructional Development
International
Research and Theory
Telecommunicators
Urban Educational Media
Armed Forces/Government Affiliate
Community College Affiliate

Association for Supervision and Curriculum Development (ASCD), 1201 Sixteenth Street N.W., Washington, D.C. 20036.

Professional organization of supervisors, curriculum coordinators, directors of curriculum, consultants, professors of education, classroom teachers, principals, and others interested in school improvement at any level of education: elementary, secondary, college, or adult. A department of the National Educational Association.

Publications: (1) *Educational Leadership,* 8 issues/year; (2) *Yearbook*; (3) *News Exchanges*; also publishes booklets.

Journals

Audiovisual Instruction, Association for Educational Communications and Technology, annual subscription $12, 1201 Sixteenth Street, N.W., Washington, D.C. 20036.

Published for the Association for Educational Communications and Technology (AECT) members. The publication features articles and issues devoted to improving instruction through use of educational technology. Regular features include film, book, and material reviews, new equipment reviews, ERIC notes and DAVI news and placement. One of the very best journals for the instructional development novice.

AV Communication Review, Association for Educational Communications and Technology, annual subscription $13, 1201 Sixteenth Street, N.W., Washington, D.C. 20036.

AV Communication Review publishes papers concerned with theory, development, and research related to technological process in education. Each quarterly journal normally contains one section each of articles, book reviews, and research abstracts.

Curriculum Theory Network, Publication Sales, The Ontario Institute for Studies in Education, Department of Curriculum, annual subscription $14, 252 Bloor St. West, Toronto, 181, Ontario.

An informal, international journal in curriculum. Published since 1968, it provides a means for the dissemination of ideas, procedures, and rules for constructing, maintaining, and evaluating alternative curricula. A forum for both curriculum researchers and practitioners.

Educational Product Report (formerly EPIE Forum), Educational Products Information Exchange, monthly Sept.-June, annual subscription $35, 386 Park Avenue So., New York, New York 10016.

The *Educational Product Reports* were established to gather, codify, and disseminate dependable information about specifications, critical characteristics, and actual school performance of instructional materials, equipment, and systems for preschool through junior college grades. Information on specific instruction material available through EPI on request from the instructional developer.

Educational Technology, Educational Technology Publications, Inc., annual subscription $18, 140 Sylvan Avenue, Englewood Cliffs, New Jersey 07632.

A magazine for "managers of change in education." Subjects discussed relate to the application of science-based knowledge to educational and instructional planning and to the solution of basic teaching-learning problems. Comprehensive, informative, and practical.

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